

NOTES

RANGE EXTENSION, CHROMOSOME COUNT, AND MEPHITISM IN *Lessingia tenuis* (COMPOSITAE).—Recent field work in Central California revealed a range extension for *Lessingia tenuis* (A. Gray) Cov.: CA, Santa Clara Co., s. side of ridge ca. 4 airline km s. of Los Gatos, near Priest Rock and power lines along a dirt road from Lexington Reservoir to Sierra Azule Ridge, ca. 517 m, *Mooring* 3517, 3530, 3538 (UC). (fide J. Strother, UC).

First observed here in 1984, these annuals were mostly 2–3 cm tall, relatively narrow-leaved, and sparsely branched. They did not conform to descriptions (Munz, A California Fl., 1959; Abrams and Ferris, Illustr. Fl. Pacific States, 1960) nor did they closely resemble the herbarium specimens I examined. Thus, an experimental study seemed appropriate.

Achenes collected at the site and sown in vermiculite in an unheated greenhouse in November readily germinated ca. 7 days later. Twenty seedlings that were planted in pots flowered an average 175 days after germination. Mature plants were 15–23 cm tall, relatively broad-leaved, and diffusely branched, in sharp contrast to their wild parents. They matched the description of *Lessingia tenuis*, and resembled some of the herbarium specimens examined. Analysis of microsporocytes stained in acetocarmine showed in three plants that $2n = 5n$ and that meiosis was regular. This count agrees with those for populations of *L. tenuis* in San Luis Obispo and Ventura cos. [Spence, A biosystematic study of the genus *Lessingia* Cham. (Compositae), Ph.D. diss., Univ. California, Berkeley, 1963]. Stainability of fresh pollen in cotton blue-lactophenol (minimum of 300 pollen grains from each of 10 plants) ranged from 76–100% ($\bar{x} = 95\%$). Greenhouse plants differed conspicuously from wild progenitors in that each had a pungent, skunk-like odor that is unreported in this genus. Spence (pers. comm.) grew large numbers of *L. tenuis* and other species of *Lessingia*, and did not notice this odor in the genus.

The presence of *L. tenuis* in the Santa Cruz Mountains represents a 60 km westward range extension. I found the population while looking for local populations of the Western Whiptail Lizard (*Cnemidophorus tigris*), which is another example of a coastward outlier of an Inner Coast Range species (Mooring, Herp. Rev. 14:123, 1983). *Lessingia tenuis* may be a recent introduction here, from nearby power lines or road, or may have increased its numbers rapidly. I have hiked through the Los Gatos site intermittently for 20 years without seeing this species. I first noticed the Los Gatos lizard populations during the high-precipitation years associated with El Niño weather, and the discovery of *L. tenuis* came about 2 years later. The numbers, density, and distribution of the population have varied. In 1984, an estimated 500 plants occurred along ca. 150 m and within 2 m of a north-to-south trail through chaparral that is dominated by *Adenostoma fasciculatum*. In 1985 most of the ca. 150–200 individuals were within the northernmost 100 m, and also were close to the trail. In 1986, however, several thousand were scattered in clumps over 358 m, including hundreds in bare or thinly vegetated soil up to 20 m from the trail. The population was less dense in the northernmost section than it had been before, possibly due to the increased use of the trail by mountain bicycles. It has expanded southward, however, and now abuts a bulldozed area adjacent to a 1985 burn that may allow further expansion.

The skunk-like odor of the Los Gatos population should be looked for in other populations of this and other species of *Lessingia*. Presence-absence patterns might be a useful taxonomic character in a group where keys (Jepson, A Man. Fl. Plants California, 1925; Munz, op. cit.; Abrams and Ferris, op. cit.) emphasize vegetative features. Pungent mephitism in *L. tenuis* seems to be associated with relatively lux-

uriant growth, and may not be obvious in wild plants. I did not notice it when collecting and observing them in 1984. In 1986 I had to sniff the wild plants to detect it, whereas half-grown wild plants that were transplanted to the greenhouse that year were, when full-grown, almost as odorous as I remembered the 1984 greenhouse-grown seedlings to be.

Mephitism may be an anti-herbivore adaptation in the Los Gatos population of *L. tenuis*. They often occur in clumps; some occur under *Adenostoma fasciculatum*, *Arctostaphylos (glandulosa?)*, or *Baccharis pilularis* subsp. *consanguinea*. The shrubs have no surrounding bare zones unlike the situations described previously (Bartholomew, *Science* 170:1210–1212, 1970; Halligan, *Bioscience* 23:429–432, 1973). Evidence of grazing by mammals is present, but the lessingias and co-occurring annuals [including *Navarettia squarrosa*(?), “skunkweed”] show no evidence of being grazed. The lessingias, however, do not have an unpleasant taste (at least to me), and greenhouse plants are attacked by whiteflies. Mephitism has been reported in *Navarettia squarrosa* (see Abrams & Ferris, op. cit.) and I had noticed it in a Santa Cruz Co. population growing in a relatively mesic site. I have not observed it among local populations, however, but neither have I sniffed the plants. Perhaps mephitism, and other strong scents, might be found to be more widespread if it is looked for in greenhouse plants derived from dense populations of apparently ungrazed herbaceous species of dry habitats.

I appreciate the comments of reviewers Pinkava and Tanowitz, and have extended the discussion of mephitism.—JOHN MOORING, Biology Department, Santa Clara Univ., Santa Clara, CA 95053. (Received 25 Jun 86; revision accepted 9 Oct 1986.)

REVIEW

Vascular Plants of Upper Bidwell Park, Chico, CA. By VERNON H. OSWALD. vi + 98 pp. The Herbarium, Department of Biological Sciences, California State University, Chico, Publication No. 3. 1986. \$5.95 plus tax and mailing.

This book has an attractive sketch of *Polygonum bidwelliae* on its soft yellow cover. The content is formatted professionally and has appeal to anyone who wishes to deal with basic botany with the assistance of keys, glossary, map, and bibliography. The preface explains the three plant communities involved and has a synoptic geological presentation. The nomenclature is up-to-date and keys involve major plant groups, divisions, families, genera, species, and subspecific taxa. Although undoubtedly incomplete (as is any other new checklist), 748 species and subspecific taxa have been tabulated. About 30% of these are introduced and this is about 50% higher than on the county list.

Two thousand acres are included in the study area. Elevations extend from 260 feet to 1520 feet. Twelve plants are listed in various categories in the C.N.P.S. rare plant inventory. There is no mention of climatology and there are no illustrations or photographs. A short addenda and errata are enclosed.

Even for amateurs who have only a superficial knowledge of botany, this professionally presented text will be found more enjoyable, and certainly more educational, than a plant list keyed to the color of the flowers.—WALTER KNIGHT, Field Associate, California Academy of Sciences, San Francisco, CA 94118.